APPENDIX G
LIVESTOCK GRAZING

Standards for Rangeland Health and Guidelines for Livestock Grazing

Introduction

The following policies, practices, and procedures developed in concert with the Western Montana RAC will be implemented in order to ensure that Bureau of Land Management (BLM) lands are healthy. The concept of healthy rangelands expresses the BLM's desire to maintain or improve productivity of plant, animal (including livestock), soil, and water resources at a level consistent with the ecosystem's capability.

In order to meet society's needs and expectations for sustained production and conservation of natural resources from BLM rangelands, use of these lands must be kept in balance with the land's ability to sustain those uses. Identifying that balance requires an understanding and application of ecological principles that determine how living and non-living components of rangelands interact. Recognition of the inter-dependence of soil, water, plants, and animals (including livestock) is basic to maintaining healthy rangelands and is the key element in BLM's Standards for Rangeland Health and Guidelines for Livestock Grazing.

Standards describe desired ecological conditions that the BLM intends to attain in managing BLM lands, whereas Guidelines define practices and procedures that will be applied to achieve Standards. While Standards will initially be applied to grazing, it is the BLM's intent to eventually apply these Standards to all rangeland uses that have the ability to affect or be affected by the ecological characteristics of rangelands.

Fundamentals of Rangeland Health

The BLM has defined four Fundamentals of Rangeland Health that are basic ecological principles underlying sustainable production of rangeland resources. These Fundamentals are embodied in the BLM's Grazing Regulations (43 CFR, Part 4100), which became effective in August of 1995. These four Fundamentals of Rangeland Health served as the basis for developing Standards for Rangeland Health and are as follows:

1. Watersheds are in, or are making significant progress toward, properly functioning physical condition, including their upland, riparian/wetland, and aquatic components; soil and plant conditions support water infiltration, soil moisture storage, and release of water that are in balance with climate and landform, and maintain or improve water quality, water quantity, and timing and duration of flow.
2. Ecological processes, including the hydrologic cycle, nutrient cycles, and energy flow, are maintained, or there is significant progress toward their attainment, in order to support healthy biotic populations and communities.
3. Water quality complies with state water quality standards and achieves, or is making progress toward achieving, established BLM management objectives, such as meeting wildlife needs.
4. Habitats are, or are making significant progress towards being, restored or maintained for Federal threatened and endangered species, Federal proposed, Federal candidate, other special status species, native species, and for economically valuable game species and livestock.

By developing Standards and Guidelines based on the Fundamentals listed above, it is the BLM's intent to achieve the following:

1. Promote healthy, sustainable rangeland ecosystems that produce a wide range of public values such as wildlife habitat, livestock forage, recreation opportunities, wild horse and burro habitat, clean water, clean air, etc.
2. Accelerate restoration and improvement of public rangelands to properly functioning condition, where appropriate.
3. Provide for the sustainability of the western livestock industry and communities that are dependent upon productive, healthy rangelands.
4. Ensure that BLM land users and stakeholders have a meaningful voice in establishing policy and managing BLM rangelands.

Standards and Guidelines

Standards are descriptions of the desired condition of the biological and physical components and characteristics of rangelands. Standards:

- are measurable and attainable;
- comply with various Federal and state statutes, policies, and directives applicable to BLM rangelands; and
- establish goals for resource condition and parameters for management decisions.

Indicators are features of an ecosystem that can be measured or observed in order to gain an understanding of the relative condition of a particular landscape or portion of a landscape. Indicators will be used by the rangeland manager to determine if Standards are being met. The indicators proposed for use are commonly accepted and used by

members of the rangeland management profession in monitoring rangelands. Methods and techniques for evaluating these indicators are also commonly available. In using these terms, it should be recognized that not every indicator applies equally to every acre of land or to every ecological site. Additional indicators not listed below may need to be developed for some rangelands depending upon local conditions.

Similarly, because of natural variability, extreme degradation, or unusual management objectives, discretion will be used in applying Standards. Judgments about whether a site is meeting or failing to meet a Standard must be tempered by a knowledge of the site's potential. Site potential is determined by soil, geology, geomorphology, climate, and landform. Standards must be applied with an understanding of the potential of the particular site in question, as different sites have differing potentials.

Guidelines are management approaches, methods, and practices that are intended to achieve a Standard.

Guidelines:
- typically identify and prescribe methods of influencing or controlling specific public land uses;
- are developed and applied consistent with the desired condition and within site capability; and
- may be adjusted over time.

It should be understood that these Standards and Guidelines are to be applied in making specific grazing management decisions. However, it should also be understood that they are considered the minimum conditions to be achieved. Flexibility must be used in applying these policy statements because ecosystem components vary from place to place and ecological interactions may be different.

Standards and Guidelines used on BLM Land in the Dillon Field Office are described in the following pages.

STANDARD #1:
Uplands are in proper functioning condition.

This will be determined by:

- Erosional flow patterns;
- Surface litter;
- Soil movement by water and wind;
- Soil crusting and surface sealing;
- Compaction layer;
- Rills;
- Gullies;
- Cover amount; and
- Cover distribution

Biotic environment

- Community diversity;
- Community structure;
- Exotic plants;
- Photosynthesis activity;
- Plant status;
- Seed production;
- Recruitment; and
- Nutrient cycle.

The determination of rangeland health should be based on the evaluation of three criteria: degree of soil stability and watershed function, nutrient cycles and energy flows, and available recovery mechanisms.

Indicators to assess soil stability and watershed function elate to two fundamental processes of watershed degradation: 1) Soil erosion be wind and water; and 2) infiltration or capture, and utilization of precipitation. Indicators such as rills, gullies, flow patterns, pedestaling and compaction, may be used to assess watershed condition.

Indicators that can be used to evaluate nutrient cycles and energy flows relate to distribution of plants, litter, roots, and photosynthetic period; i.e. plant community diversity and structure, exotic plants, photosynthetic activity and plant status.

Recovery mechanisms or plant demographic indicators may include increasing vegetative cover, plant vigor, kind and number of seedlings, and changes in plant age distribution.

Physical environmental features of a proper functioning watershed are indicated by:

- Little evidence of soil erosion by wind and/or water;
- Rills, gullies, pedestaling, flow patterns are not present (significant);
- Surface sealing and soil crusting is not evident;
- Plant (ground) cover and litter accumulation is adequate to protect site; and
- Natural disturbance events are integral to proper ecosystem function.

Biotic environment features of a proper functioning watershed are indicated by:

- Variety and number of plant life-forms (grass, forb, shrub, tree, succulent) across the site;
- Plants exhibit a good diversity of size, height, distribution, and age/class well distributed;
- Exotic plants, weeds are absent or sparse on site;
- Plants display normal growth and root development;
- Photosynthesis activity occurs throughout the site;
- Plants are alive, productive with well developed root systems;

- Seed stalks/seed adequate for stand maintenance for all life-forms;
- Litter distribution and incorporation is uniform across site; and
- Nutrient/energy cycle mechanisms are adequate for plant maintenance.

STANDARD #2:
Riparian and wetland areas are in proper functioning condition.

This will be determined by:

Hydrologic

- Flood plain inundated in relatively frequent events (1-3 years);
- Amount of altered streambanks;
- Sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region);
- Riparian zone widening; and
- Upland watershed not contributing to riparian degradation.

Erosion Deposition

- Flood plain and channel characteristics; i.e., rocks, coarse and/or woody debris adequate to dissipate energy;
- Point bars are vegetating;
- Lateral stream movement is associated with natural sinuosity;
- System is vertically stable;
- Stream is in balance with water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition); and
- Bare ground.

Vegetation

- Reproduction and diverse age structure of vegetation;
- Diverse composition of vegetation;
- Species present indicate maintenance of riparian soil moisture characteristics;
- Streambank vegetation is comprised of those plants or plant communities that have deep binding root masses capable of withstanding high streamflow events;
- Utilization of trees and shrubs;
- Riparian plants exhibit high vigor;
- Adequate vegetative cover present to protect banks and dissipate; energy during high flows; and
- Plant communities in the riparian area are an adequate source of large woody debris.

Broadly, "proper functioning condition" may be defined as the ability of a stream to perform its riparian functions. These functions include sediment filtering, bank building, water storage, aquifer recharge, and hydrologic energy dissipation.

No single factor or characteristic of a riparian site can provide a complete picture of either that site's condition or the direction of its successional change. Things considered "negative" in traditional evaluations of ecological sites may not be such for riparian sites. For example, the percent of exposed soil surface, which often reflects overgrazing or erosion on upland sites, may be a result of normal riparian activity; sediment deposition resulting after spring runoff, or a high water event.

Hydrology/Streambanks

The hydrology of a riparian area is perhaps its most important characteristic. Changes in hydrology may result in short and long-term vegetative changes. In some situations, construction (rip rap, roads, railroads, etc.) has influenced the streambanks and stability has been increased over the natural levels. These streambanks may eventually lose their stability, and become altered. This generally occurs if the problems which caused the weak streambanks have not been remedied. Also, constructed streambanks (especially those with rip rap) will often disrupt the normal energy dissipation of the stream an eventually the meandering of a stream can result in the erosion of streambanks downstream.

Lateral Cutting

Lateral cutting is indicated by new stream-caused bank disruption along the outside of stream curves, and much less commonly along the straight portions of a stream. A high degree of active lateral cutting can indicate a degraded watershed.

Altered Streambanks

In many instances, land uses have degraded streambanks, accelerating stream movement across the flood plain. We define altered streambanks as those having impaired structural integrity (strength or stability) due to human-caused activities such as exposed soil surfaces from cattle trails and wallows, hiking and ATV trails, roads, logging skid trails, mining activities, etc.

Deep Binding Root Mass

Properly functioning streambanks are "armored" by both vegetation and bank rock materials (e.g. boulders and cobbles). There have been few studies documenting the depth and extent of root systems of various plant species. Despite this lack of documented evidence, some generalizations can be made. All tree and shrub species are considered to have deep, binding root masses. Among riparian herbaceous species, the first rule is that annual plants do not

have deep, binding root mass qualities. Perennial species offer a wide range of root mass qualities. Some rhizomatous species, such as the deep-rooted sedges, are excellent streambank stabilizers. Other rhizomatous species such as Kentucky bluegrass, have only shallow root systems and are poor streambank stabilizers. Still others such as Baltic rush, appear to be intermediate in their ability to stabilize banks.

Downcutting

Active downcutting of a stream is often hard to recognize. Perched wetland vegetation and streambank features, plus the lack of a separate layer of channel bottom materials (i.e., the stream flows directly on the substrate material), can be clues to downcutting. A stream is incised when downcutting of the stream has resulted in a width to depth ratio so low that average 2-year floods do not come out of the banks.

Soils/Geology

The soils and geology (landform and parent material) of a riparian site influence how the site reacts to disturbances and changes over time. Changes in physical characteristics are often (but not always) more difficult to remedy through management actions than are vegetative changes. The depth and texture of soil, of a riparian site, influences the capacity of that site to hold water (act as a sponge) for prolonged late season flows and support desired vegetation.

Bare Ground

Exposed soil surface is important in evaluating the health of riparian areas for several reasons:

- Vulnerability to erosion;
- It may contribute to, as well as reflect, streambank deterioration;
- The more exposed soil, the less vegetation is available for soil protection and sediment entrapment; and
- Exposed soil provides opportunity for invasion by noxious weeds and undesirable species.

Vegetation

Because they are more visible than soil or hydrological characteristics, plants may provide early indications of riparian health.

Reproduction of Trees and Shrubs

One of the clearest indicators of ecological stability, and subsequent health, is the presence of all age classes (seedling, sapling, pole, mature, decadent, and dead) of tree and shrub species where the potential exists.

Dead and Decadent Trees and Shrubs

The amount of dead and decadent material in trees and shrubs is another indicator of the overall "health" of riparian areas. Large amounts of decadent and dead woody material may indicate fluctuations in climate, such as severe winter temperatures, spring freezes, or insect infestations. In all cases, the overall biotic health is effected and may ;have implications on physical features of a stream such as streambank integrity, channel incisement, and lateral cutting.

Utilization of Trees and Shrubs

Heavy utilization by livestock and/or wildlife can prevent the regeneration or establishment of woody species and thus block succession of the plant community toward a later seral stage. As with herbaceous species, excessive use of these woody species may cause their elimination from the site and their replacement by disturbance-induced species or undesirable invaders.

Plant Composition

The presence of disturbance-induced herbaceous plants (either native or introduced) may indicate that the site could be more healthy and thus is not performing its optimum riparian functions. Most of these species provide less soil holding and sediment trapping capability, and less desirable forage for livestock and wildlife.

STANDARD #3:
Water quality meets State standards.

This will be determined by:

- dissolved oxygen concentration;
- pH;
- turbidity;
- temperature;
- fecal coliform;
- sediment;
- color;
- toxins; and
- other parameters: ammonia, barium, boron, chlorides, chromium, cyanide, endosulfan, lindane, nitrates, phenols, phosphorus, sodium, sulfates, etc.

When discussing rangeland health, water quality is a relative term which must be associated with water-use to become meaningful. Since the beginning of time, natural processes have influenced the chemical, physical, and biological characteristics of water. The natural quality of water varies from place to place, with the season of the year, with the climate, and with the kind of rock and soil through or-

ganic materials such as roots and leaves, and reacts with living things such as microscopic organisms like plankton and algae. Natural water quality is changed by stream sediments; it is modified by temperature, soil bacteria, and evaporation. These and other factors determine the quality of natures "impure" water.

Water quality criteria specify concentrations of water constituents which, if not exceeded, are expected to support an aquatic ecosystem suitable for higher uses of water. Water quality criteria are intended to protect essential and significant life in water, as well as the direct users of water, and also to protect life that is dependent on life in water for its existence.

Some of the common indicators of water quality are:

- Dissolved oxygen concentration (DO) is a function of temperature of the water, altitude and barometric pressure. The ability of water to hold oxygen decreases with the increases in temperature, altitude and dissolved solids. This is important in fish spawning areas where DO levels must be maintained at specific levels for good growth and general well being of fish and associated biota.
- pH (hydrogen-ion concentration) is a an indicator of acidity and /or alkalinity an d an index of hydrogen-ion activity. Lower values indicated acid, higher values indicated alkaline. Fresh water organisms function properly if the pH ranges from 6.0 to 9.0 units. pH concentrations below the recommended level are toxic to fish and other aquatic organisms.
- Turbidity is the disturbance of water due to the presence of suspended matter such as clays, silt, organic matter, and various effluents. It is the expression of the optical property of water. Excess turbidity reduces light penetration, which reduces photosynthesis by phytoplankton, and submerged vegetation.
- Temperature is an important function which affects aquatic productivity. Temperature changes may result from natural climatic conditions due to man's manipulation of the riparian environment. Temperature is a function of location, season, time, duration of flow, depth, and many other variables. Aquatic biota are adapted to certain thermal conditions existing in the habitat for their survival and well being. The interrelationship between these conditions is so great that small changes in temperature may have far-reaching effects.
- Coliform groups include bacteria organisms in their natural habitat and sources, i.e., feces, soil, water, vegetation, etc. Fecal coliform may be an indicator of recent fecal pollution. Other coliform organisms may be the result of plant and soil runoff water.
- Sediment is a measure of suspended sand, silt, colloid and organic matter which will settle in time to the stream bottom. They originate from sources such as erosion, mine waste, plowed fields, construction projects, natural erosion, or vegetative manipulation. They may affect fisheries by covering the bottom of the stream or lake with a blanket of material that destroys the bottom fauna or spawning grounds for fish.
- Color is attributed to substances in solution after the suspensoid have been removed. It may be organic or inorganic substances that affect photosynthesis activity in the water. Organic substances include humic materials, peat ,aquatic plants, etc. Inorganic sources include iron and manganese compounds, chemicals, industrial waste, etc.
- Toxins are those compounds or substances which are found in by-products or waste of the various industries or activities that make their way into water sources which produce a varity of effects of fish or alter the biological productivity of water sources.

Acceptable water quality is indicated by:

- Dissolved oxygen concentrations – DO concentrations are being maintained at or near saturation levels.
- pH concentrations are at or near recommended State levels.
- Turbidity readings do not exceed Jackson Turbidity Unit readings for the water source.
- Water temperature readings meet State standard preferred for good growth and productivity.
- Coliform – organisms of the coliform group do not exceed State standard.
- Sediment – water normally contains suspended solids that do not exceed State standard.
- Color – water color does not limit or significantly restrict photosynthesis processes.
- Toxins – levels are in conformance with State standard.

STANDARD #4:
Air quality meets State standards.

This will be determined by:

Section 176 (c) of the Clean Air Act, which states that activities of all Federal agencies must conform to the intent of the appropriate State Air Quality Implementation Plan and not:

- Cause or contribute to any violation of ambient air quality standards;
- Increase the frequency of any existing violations; and
- Impede the State's progress in meeting its air quality goals.

Montana Air Quality Standards

PM-10	50 ug/m3 annual ave. 150 ug/m3 24-hr. ave.*
Sulfur Dioxide	0.02 ppm annual ave. 0.10 ppm 24-hr. avg.* 0.50 ppm 1-hr. avg.**
Carbon Monoxide	23 ppm hourly avg.* 9.0 ppm 8-hr avg.*
Nitrogen Dioxide	0.05 ppm annual avg. 0.30 ppm hourly avg.*
Ozone	0.10 ppm hourly avg.*
Lead	1.5 ug/m3 90 day avg.
Foliar Fluoride	35 ug/g grazing season avg. 50 ug/g monthly avg.
Settled Particulate	10mg/m2 30-day avg. Matter (dustfall)
Hydrogen Sulfide	0.05 ppm hourly avg.*
Visibility	particle scattering coefficient of 3x10-5 per meter annual average.***

* Not to be exceeded more than once per year.
** Not to be exceeded more than 18 times per year.
*** Applies to PSD mandatory Class I areas.

The Clean Air Act established the Prevention of Significant Deteriorations (PSD) regulations which set limits for increases in ambient pollution levls and established a system for preconstruction review of new major air pollution sources. Three PSD classes have been established: Class I, Class II, and Class III. Class I areas consist of all international parks, national parks greater than 5,000 acres, national wilderness areas greater than 5,000 acres, and national wildlife refuges which existed on August 7, 1977, when the amendment was signed into law.

Protection of air quality is provided to Class I areas by severely limiting the amount of additional human-caused air pollution which can be added. All other areas, except nonattainment areas, are classified as Class II in which a greater amount of additional human-caused pollution may be added. In no case, however, may pollutant concentrations exceed the National or State ambient air quality standards.

STANDARD #5:
Provide habitat as necessary, to maintain a viable and diverse population of native plant and animal species, including special status species.

This will be indicated by:

- Plants and animals are diverse, vigorous and reproducing satisfactorily, noxious weeds are absent or insignificant in the overall plant community;
- Spatial distribution of species is suitable to ensure reproductive capability and recovery;
- A variety of age classes are present;
- Connectivity of habitat or presence of corridors prevents habitat fragmentation;
- Diversity of species (including plants, animals, insects, and microbes) are represented; and
- Plant communities in a variety of successional stages are represented across the landscape.

BLM is charged with managing and developing habitat for a large variety of fish, wildlife, and special status species of plants. Basic habitat considerations can be categorized as including food, water, cover, and space. Specific habitat requirements often vary depending on what geographic area is being considered, species which are present, and the nature and extent of other uses which may be competing. A review of components of the above listed standards (Proper Functioning Riparian-Wetland areas, Uplands and Water Quality) will provide much of the requirements needed to achieve, fish, wildlife, and special status plant habitat.

Guidelines

GUIDELINE #1:
Manage grazing to maintain or improve watershed vegetation, biodiversity, and flood plain function. Maintain or improve riparian vegetative cover and structure to trap and hold sediments during run-off events to rebuild streambanks, restore/recharge aquifers, and dissipate flood energy. Promote deep-rooted herbaceous vegetation to enhance streambank stability. Where potential for woody shrub species (willows, dogwood, etc.) exists, promote their growth or expansion to aid in controlling access to streambanks, and to provide wildlife cover.

GUIDELINE #2:
Pastures and allotments will be periodically inventoried to determine their relative suitability for livestock grazing. Topography, slope, distance from water, or vegetation habitat types, wildlife, channel types, soil types, and other resource values must be considered when determining grazing potential. Specific areas could be excluded from grazing, fenced into separate management pastures, or managed more intensively.

GUIDELINE #3:
Management strategies for livestock grazing should produce sustainable hydrological, vegetative, and soil conditions. Thresholds for acceptable streambank alteration and vegetation utilization can be site-specific, and they should be the basis for establishing terms and conditions for allotments. These thresholds should be consistent with standards and

result from application of scientifically acceptable hydrological and biological principles. Each allotment must have a monitoring plan, and monitoring results should be critical input to grazing system design. Long-term analysis of trend shall be the primary monitoring information. Monitoring plans should address rangeland standards including hydrologic, vegetative, and soil conditions.

Long-term and short-term monitoring attributes may include:

Hydrologic
- Stream morphology; and
- Streambank alteration.

Vegetative
- Species composition;
- Plant density;
- Demographics;
- Stubble height; and utilization

Soils
- Percent bare ground;
- Compaction; and
- Pedestaling.

Self-monitoring by permittee should be encouraged, but with these sideboards:
- Permittee's data and BLM's data should be comparable;
- BLM must perform some level of compliance monitoring for each self monitored allotment to ensure the permittee's monitoring is being done and it is valid;
- There should be regular reporting of self-monitoring data; and
- When appropriate, monitoring should include the use of reference sites (such as exclosures).

Permittees and interested members of the public should be able to participate in the development of monitoring plans.

GUIDELINE #4:
Compatible seasons and duration of use, rest periods, stocking rates, structural facilities, and management activities, should be designed and implemented to ensure that standards are achieved.

GUIDELINE #5:
The development of springs and seeps or other projects affecting water and associated resources shall be designed to protect the ecological functions, processes and native species of those sites.

GUIDELINE #6:
Locate facilities (e.g. corrals, water developments) away from riparian areas and wetlands when possible.

GUIDELINE #7:
Supplement salt and minerals should not be placed adjacent to watering locations or in riparian-wetland areas so not adversely impact streambank stability, riparian vegetation, water quality, or other sensitive areas. Placement of salt in upland sites should consider critical winter wildlife habitat.

GUIDELINE #8:
Noxious weed control is essential and should include: cooperative agreements, public education, and integrated pest management (mechanical, biological, chemical). Butte RAC has addressed weeds in a Resolution dated May 8, 1996.

GUIDELINE #9:
Native species are preferred. Non-native species, where contributing to proper ecosystem function, are acceptable.

GUIDELINE #10:
Livestock management should utilize Best Management Practices for livestock grazing that meet or exceed those approved by the State of Montana in order to maintain, restore or enhance water quality.

GUIDELINE #11:
Grazing management practices should maintain or improve habitat for federally listed threatened, endangered, and sensitive plants and animals.